REMARKS

Reconsideration of this application is respectfully requested.

I Status of the Claims

Claims 20-22 are pending. The amendment to claim 20 and new claims 21 and 22 do not add new matter. Claims 21 and 22 exclude a straight layer between the perpendicular layer and the first angled layer.

II Telephone Interview

Applicants would like to thank Examiner Aftergut for the courtesies extended to Louis DelJuidice in the telephone interview of June 20, 2003.

III Rejections Under 35 U.S.C. § 103(a)

Claim 20 stands rejected under 35 U.S.C. §103(a) as obvious over Jackson (U.S. Patent 3,646,610) in view of Sugiyama (JP 08-131588), and Kusumoto (U.S. Patent 6,106,413). Claim 20 has also been rejected under 35 U.S.C. §103(a) as obvious over applicants' admitted prior art in view of Jackson, Sugiyama, and Kusumoto.

Applicants respectfully traverse the above rejection. The combination of Jackson, Sugiyama, and Kusumoto do not disclose or suggest every element of the claimed invention. Claim 20 now recites that "said golf club shaft having a weight of 30 to 40 grams." Jackson discloses "that the preferred shaft has been constructed according to my invention in which the total shaft weight is 0.31 [pounds or 140.9 grams]." Jackson, column 4, lines 1-3.

Sugiyama states that he provides "a golf club shaft ... [that is] light weight". Sugiyama, Abstract. However, Sugiyama does not provide a specific weight for his "light weight" shaft. Kusumoto, Berg (U.S. Patent 5,984,804), VanAuken (U.S. Patent 4,023,801), and Lauratitis (U.S. Patent 4,000,896) are similarly silent with respect to the weight of their respective golf shafts. Thus, neither Jackson, Sugiyama, Kusumoto, Berg, VanAuken, nor Lauratitis teach or suggest every element of claim 20 and the present rejection should be withdrawn.

Further, the Examiner has not made a *prima facie* showing of obviousness as Jackson, Sugiyama, and Kusumoto do not, alone or in combination, teach or suggest every element of the claimed invention. Rather, the Examiner is improperly using hindsight to reject the claim. Claim 20 is directed to a method for forming a golf club shaft by forming particular layers with particular orientations in a particular order.

Jackson's invention is unlike both the present invention and all other references cited by the Examiner in that Jackson's golf club shaft is composed of fiberglass. In contrast, the present invention and the other references are formed of fiber-reinforced polymer composites ("FRP"). One of ordinary skill in the art is aware that a golf club should maximize several key properties. In particular, the performance of all golf club shafts is affected by flexural rigidity, flexural strength, torsional rigidity, torsional strength, and crushing strength. One of ordinary skill in the art is also aware that each material that could be employed to make golf club shafts contributes differently to different properties. Any layering schemes taught by Jackson, or any other fiberglass club, are not obviously applicable to layering schemes demonstrated by an FRP golf club shaft because the differences in bonding between and within layers of material yield significantly different wear resistant behaviors.

The present invention is comprised of a fiber-reinforced polymer composite material. Individual polymer fibers are held together within a single layer of FRP solely by the resin matrix. When layers of FRP are placed one on top of the other, as in the present invention, the resin from one layer connects and intermingles with the resins of the layers above and below. Thus, when the total FRP construction is cured, the resin bonds the parallel files of its own layer together as well as holds the fibers in multiple layers in place.

Fiberglass consists of a matrix of glass fibers aligned parallel to one another along a longitudinal axis. Into this matrix, a thermosetting resin is poured. Also mixed into this matrix are smaller glass fibers with a length less than the width of the total fiberglass layer. These fibers are strewn in at odd angles and form an additional strengthening and bonding layer. There are no such chopped fiber components present in within the layers of FRP materials. One of ordinary skill in the art is aware that the physical properties gained by the specific fiberglass layers are not directly reproducible using the identical orientations of FRP layers. The bonding between the fiberglass layers and the FRP layers differ and thus the physical properties differ.

Jackson discloses a fiberglass golf shaft wherein "the longitudinal fibers are continuous and uniformly distributed about the axis and throughout the length of the shaft and are bound together by the binder and by chopped fiber glass particles or chopped filaments; said particles are dispersed at random throughout the length of the shaft, the chopped particles being preferably of greater length than width." Jackson, column 2, lines 26-33. Chopped glass fibers constitute a major reinforcing agent in the bonding of fiberglass layers.

Jackson layers fiberglass material one on the other and extra chopped fiber glass particles are placed along the interface in addition to the intermingling resin. The additional particles are distributed at a variety of angles with respect to the longitudinal axis of the golf shaft and serve an integral function by strengthening the bond between layers. Jackson states, "chopped fiber glass particles are disposed between the respective layers, and are distributed at random, lying in different directions securing the different layers together and securing the separate longitudinally extending glass fibers together and the helically wound fibers together." Jackson, column 2, lines 52-56. FRP materials do not include chopped fiber components between the FRP layers. The lack of chopped fiber components is another principle difference between fiberglass and FRPs that alters the resulting physical properties between the two substances and the resulting golf club shafts.

During the normal use of a golf club, the shaft comes under many tensions, stresses, and torsional forces that pull on the fibers in an FRP material or fiberglass in different manners. For FRP materials, the largest wear resistance (and hence greatest strength in a golf shaft under that particular stress) occurs when the force induces sliding of the fiber normal to its orientation. The lowest wear resistance is found when the fiber was inclined to slide transverse to its orientation. Applying a force to a fiber such that it was inclined to slide parallel to its orientation provides only slightly more wear resistance than a transverse slide.

Fiberglass and FRPs have sufficiently different material properties that one of ordinary skill in the art would not presume that a layer with beneficial properties in one type of club would provide the same beneficial properties in the other. Applicants submit that the wrapping of FRP layers in the present invention is novel and unobvious in light of Jackson, Sugiyama,

and Kusumoto. Under most tensions or stresses the golf club shaft may encounter, the present arrangement of fibers possesses no layer that aligns fibers normal to the longitudinal axis of the shaft. The novel method of wrapping the golf club shaft of the present invention with fibers transverse, parallel, or some angle in between transverse and parallel provides frictional wear resistance within the matrix fibers. The wrapping makes the club unusually strong and resistant to such forces while retaining a light weight. The strength of the golf club shaft of the present invention is notably achieved without the incorporation of any chopped fiber particles within or between layers, as is shown in Jackson.

Jackson teaches layers with fibers varying in angles between transverse and parallel to the shaft's longitudinal axis (but no actual transverse layer) and fibers parallel to the longitudinal axis. However, within the matrix of fibers in each layer and between layers there are short, chopped bits of glass fiber arranged at varying angles. Some of these fibers will be normal (or arranged at an angle between normal and transverse or normal and parallel to the shaft's longitudinal axis) and they provide additional connecting strength and resistance to friction, force, and other wear-inducing forces for Jackson's invention. The chopped fibers add wear resistant properties in a manner which cannot be directly emulated by any FRP golf club shaft.

Sugiyama constructs a golf club shaft out of FRP layers but, his layers, as demonstrated by his claims, figures, and specifications, are not arranged similarly to the present invention. Sugiyama suggests that there be "a thin hoop reinforced layer 103' whose fiber aligning direction makes a right angle with the shaft axis." Sugiyama, Abstract. The Examiner currently contends that combining the layering patterns of Jackson, which provides for an

angled inner-most layer, with the reinforcing layer perpendicular to the shaft's longitudinal axis from Sugiyama would be an obvious improvement to one of ordinary skill in the art.

In contrast, the present invention shows an inner reinforcing layer made of FRP, as are all the layers of the present invention. There first layer placed on top of said reinforcing layer in the present invention is an angled layer. However, there is no motivation at the time the present invention was made in either Sugiyama or Jackson to combine the two references in a manner that would lead to the presently claimed invention. Sugiyama places a straight layer of FRP fibers on top of his inner perpendicular reinforcing layer. The frictional relationship between perpendicular and parallel fibers is different than the relationship between perpendicular and the angled fibers found in the present invention. Sugiyama does not teach or suggest putting an inner perpendicular reinforcing layer under an angled layer.

The connectivity between fiberglass layers arranged around a mandrel, as in the formation of a golf club shaft in Jackson, is entirely different than the formation of FRP layers around a mandrel, as in the present invention. As above, fiberglass has small, chopped fibers dispersed within each individual layer's matrix and between the layers that are strewn at a variety of angles. The chopped fibers provide different connecting strength, resistance to force, and other wear resistant properties unlike those available in FRPs.

One of ordinary skill in the art is not motivated to combine the teachings of Jackson and Sugiyama because the bonding between layers of fiberglass and the bonding between layers of FRP material are substantially different and changes the wear resistant properties of the shafts in question such that comparisons between the two systems cannot fairly be drawn. The use of

chopped fibers between and within fiberglass layers is a separate technique and, although analogous, is not equivalent to the use of FRPs without chopped particles.

The Examiner has also stated that the combination of Kusumoto would lead to an outer reinforcement layer parallel to the longitudinal axis of the shaft. Additionally, the Examiner has stated that a combination of Jackson with Kusumoto would motivate one of ordinary skill to add an outer longitudinal reinforcing layer of FRP material. However, Kusumoto's invention is comprised of "fiber reinforced fibers impregnated with synthetic resin." Kusumoto, column 13, lines 42-43. Jackson discloses a fiberglass golf club shaft. Kusumoto does not disclose chopped pieces distributed into the fiber matrix of each layer or between layers, as is specified by the fiberglass construction of Jackson. Thus, the same differences in connectivity and strength properties discussed above would be manifest to one of ordinary skill in the art and one is not motivated to combine Jackson and Kusumoto.

None of the three references disclose or suggest, alone or in combination, the entire claimed invention. Additionally the disclosed inventions of Berg, Lauratitis, and VanAuken are all specified as composed of FRP materials. By the same argument as used to dispute the combinations of Jackson and Sugiyama and Jackson and Kusumoto, applicants submit that combinations between the layering schemes of these three inventions with Jackson's fiberglass golf shaft are similarly nonobvious.

Applicants respectfully submit that the present invention provides a specific number, orientation, and specific ordering of the layers. The Examiner is treating mixing and matching layers as obvious without any consideration of the material differences between references. One of ordinary skill in the art, in general, is not motivated to add or subtract a

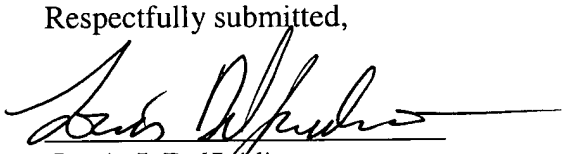
specific layer without direct teaching as this would affect the properties of the golf club shaft. In conclusion, none of the references, alone or in combination, teach or suggest all of the elements of the presently claimed invention. Additionally, neither the references nor the Examiner's comments provide sufficient motivation to one of ordinary skill in the art to combine the references. The Examiner is improperly using hindsight by using the disclosure of the present invention to assemble the disparate parts of the references to render obvious the present invention. Thus, Applicants respectfully request that the above rejection be withdrawn.

CONCLUSION

In view of the foregoing, it is believed that the claims are in condition for allowance and it is respectfully requested that the application be reconsidered and that the pending claims be allowed and that the case is passed to issue.

If there are any other issues remaining to be examined or believed to be resolved to either a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

Respectfully submitted,



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